

Dept. of Vet. Med.,
Faculty of Vet. Med., Suez Canal University.
Head of Dept. Dr. Th.S. Nafie.

**CHANGES IN BLOOD SERUM TOTAL PROTEIN
AND ITS FRACTIONS IN DONKEYS VACCINATED
BY BABESIA EQUI ANTIGEN**
(With 1 table and 3 figures)

by

**Th.S. NAFIE; A.A. AAMER;
Th.S. ABD EL-ALL and M.H. KARRAM**
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التغيرات في البروتين الكلي وجزئياته في مصل دم الحمير المحصنة
بلفاح ملاريا الخيل

ثروت نافع ، أحمد عامر ، ثروت عبد العال ،
محمد كرام

تم دراسة مستويات البروتين الكلي وجزئياته والتحليل الكهربائي قبل وبعد تحصين الحمير بلفاح ملاريا الخيل . وقد أجريت الدراسة على عدد 8 حمير في عمر ستة أشهر وحصنت باستخدام لقاح محضر من عترة محلية لطفيل *B. equi* وأخذت عينات سيروم قبل التحصين و 10 و 20 و 30 يوم بعد التحصين . وتم قياس قيمة البروتين الكلي وأجزائه بالتحليل الكهربائي للبروتين . وأسفرت الدراسة عن زيادة عالية المعنوية (1%) في البروتين الكلي وألفا وبيتا وجاما جلوبيولين بعد عشرة وعشرين وثلاثين يوماً من التحصين بينما لم تتغير قيمة الألبومين بعد التحصين .

SUMMARY

Total protein and its fractions were investigated before and after vaccination of donkeys by *Babesia equi* antigen. The experiment was carried out on 8 donkeys aged 6 months and vaccin. Blood serum was obtained before and 10, 20, and 30 days post vaccination. The study revealed a highly significant increase in serum total proteins, alpha, beta, and gamma globulins which achieved a prominent elevation 10, 20, and 30 days post vaccination. Albumin absolute values were not significantly changed.

INTRODUCTION

Several studies were conducted on *B. equi* and its animal health (ROBY & ANTHONY, 1963; NAFIE, et al. 1982, NAFIE, 1983 and NAFIE et al. 1987 & 1990). Recently *B. equi* attracted the attention in Egypt where NAFIE (1981 & 1983) presented the clinical picture of the disease among donkeys and the effect of the acute and chronic infestation on some parameters in blood serum including the total protein variations. Several trials were performed to vaccinate donkeys by *B. equi* antigen

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and these trials achieved some success (NAFIE, et al., 1986). However, the effect of the vaccination on the protein fractions was not attempted in donkeys. DWIVEDI & GAUTAM (1980) demonstrated the effect of experimental infection of calves by B. bigemina on the electrophoretic pattern of serum proteins. They noticed that a mild increase in the level of gamma globulins in the later stages of the disease and a slight elevation in the level of alpha and beta fractions in the earlier stages. The literature dealing with this subject in equine is paucity.

Hence, the aim of this study is to investigate the sequential changes in the total serum proteins and the related electrophoretic patterns before and after vaccination of donkeys by B. equi antigen. This may be of help in the interpretation of proteins and its fractions in this species during examination or any question dealing with liver or immune status of the animal.

MATERIAL & METHODS

Eight young male donkeys of 6 months age were kept in a clean dry stable. The openings of the stable were completely covered by a fine network of aluminium to keep the stable free from flying insects. Donkeys were treated against internal parasites using Ivomec* and sprayed every 15 days by Neocidol** 1: 1000 one month before conduction of the experiment. Repeated blood smears proved that the used donkeys were free from blood parasites. All donkeys were vaccinated by B. equi antigen*** at a dose rate 3×10^6 parasite/animal. The antigen was previously prepared from native B. equi species (SALEM, ET AL. 1986). All animals were observed clinically up to the end of the experiment.

Four batches of blood samples were collected from the jugular vein of tested animals to obtain serum which was transmitted directly to the laboratory for total protein determination and respective fractions. The first gain was just before vaccination and then 10, 20, and 30 days post vaccination.

Total protein was determined using test kit (bio-Mereux, Bains, France) according to WIESHSELBAUM. (1964). Electrophoresis was conducted using the horizontal zone electrophoresis on agarose slides (Jain, 1986) and absolute values of each fraction were calculated mathematically.

The statistical analysis were conducted using T-test according to SNEDECOR & COSHRAN (1967).

*: MERK & Co. INC. RAHWAY, N.J., U.S.A.

** : CIBA - GEIGY. ANIMAL DEPT.

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RESULTS

Table (1) showed the mean values of total protein, albumin, globulin and the mean relative and absolute values of globulin fractions α_1 , α_2 , β_1 , β_2 and gamma globulins before and 10, 20, 30 days post vaccination (PV). Fig. (1) showed the mean absolute values while Fig. (2) showed the variations in the relative values and Fig. (3a, b, c, & d) showed scanning and electrophoregram in one animal as a representative.

DISCUSSION

The study revealed that serum protein recorded a highly significant increase on the 10th. and 20th. day PV. The respective concentration amounted 11.3 & 9.2gm./dl. On the other hand a relative decrease in albumin was noticed on the 10th., 20th., & 30th. day post vaccination.

Total globulins revealed an absolute and relative increase PV. Specifically α_1 fraction behaved in a different pattern of increase where it recorded a significant increase in its absolute values on the 10, 20, and 30th day PV. Relative increased values of this fraction, on the other hand, were reached only on the 20th & 30th day PV.

The increase of absolute α_2 levels existed only on the 20th day P.V. with a decrease in relative values after the elapse 10th day PV whereafter it showed an increase on the 30th day PV.

β_2 fraction recorded a significant increase in the absolute values and a highly significant increase 20 and 30 days post vaccination, while relatively it recorded a highly significant decrease 20, 30 days PV.

Gamma globulin fraction achieved a highly significant increase in both relative and absolute values, 10, 20 and 30 days PV. It was also observed that the absolute figures were specific to express the state of albumin and globulin fractions especially when serum total protein values significantly changed (ALLEN AND DALTON, 1975).

Similar changes were observed DWIVEDI & GAUTAM (1980) in calves experimentally infected by *B. bigemina* as they recorded a moderate but progressive fall in relative values of albumin, a mild increase in the level of gamma globulins with a slight elevation in alpha and beta proteins in the earliner stages of the disease. VELLINI ET AL. (1969) recorded a variable increase (1.7-4.0%) in the level of gamma globulins in cattle primumunized against babesiosis and anaplamosis and they concluded that specific antibodies lie in this protein fraction.

It could be concluded that vaccination of donkeys by *b. equi* pure antigen increase the serum total protein and such increase could be attributed mainly to the increased levels of gamma-globulins and to some extent α_1 and β_1 fractions. From the other hand the history of vaccination must be taken in cosideration in the evaluation of the labutatory findings of total protein and its fractions in the diagnosis of hepatopathy and the immune status of such animals.

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Table (1) : Mean values and percentage of total protein and its fractions before and after vaccination .

Period of the exp.	Total prot. gm/dl	Albumin		Globulin		Globulin fractions									
		%	gm/dl	%	gm/dl	α_1 %	α_1 gm/dl	α_2 %	α_2 gm/dl	B ₁ %	B ₁ gm/dl	B ₂ %	B ₂ gm/dl	B %	B gm/dl
Before	6.3 ± 0.1	52.59 ± 1.2	3.33 ± 0.1	47.42 ± 1.2	2.99 ± 0.07	6.0 ± 0.4	0.38 ± 0.02	10.13 ± 0.4	0.64 ± 0.03	9.5 ± 0.74	0.6 ± 0.05	14.6 ± 0.7	0.92 ± 0.03	7.2 ± 0.5	0.45 ± 0.03
10 days Post vaccination	11.3 ± 0.6	37.73 ± 1.7	4.2 ± 0.28	62.77 ± 1.2	7.09 ± 0.4	4.76 ± 0.5	0.53 ± 0.04	6.47 ± 0.6	0.73 ± 0.1	6.7 ± 0.4	0.75 ± 0.04	15.8 ± 1.3	1.8 ± 0.2	29.02 ± 0.95	3.3 ± 0.2
20 days Post vaccination	9.2 ± 0.1	37.5 ± 0.6	3.43 ± 0.07	62.03 ± 0.5	5.7 ± 0.1	12.9 ± 0.4	1.18 ± 0.04	9.8 ± 0.6	0.89 ± 0.05	9.8 ± 0.4	0.9 ± 0.04	5.7 ± 0.3	0.52 ± 0.02	24.4 ± 0.6	2.2 ± 0.1
30 days Post vaccination	7.3 ± 0.1	41.3 ± 0.3	3.04 ± 0.1	58.69 ± 0.8	4.3 ± 0.06	12.9 ± 0.6	0.94 ± 0.03	9.9 ± 0.6	0.71 ± 0.05	18.5 ± 0.7	1.35 ± 0.03	7.47 ± 0.4	0.58 ± 0.06	9.9 ± 0.2	0.73 ± 0.02

* Significant at (P/0.05)

** Highly sig. at (P / 0.01).

Fig. (1): Mean percentage of protein fraction before and after vaccination.

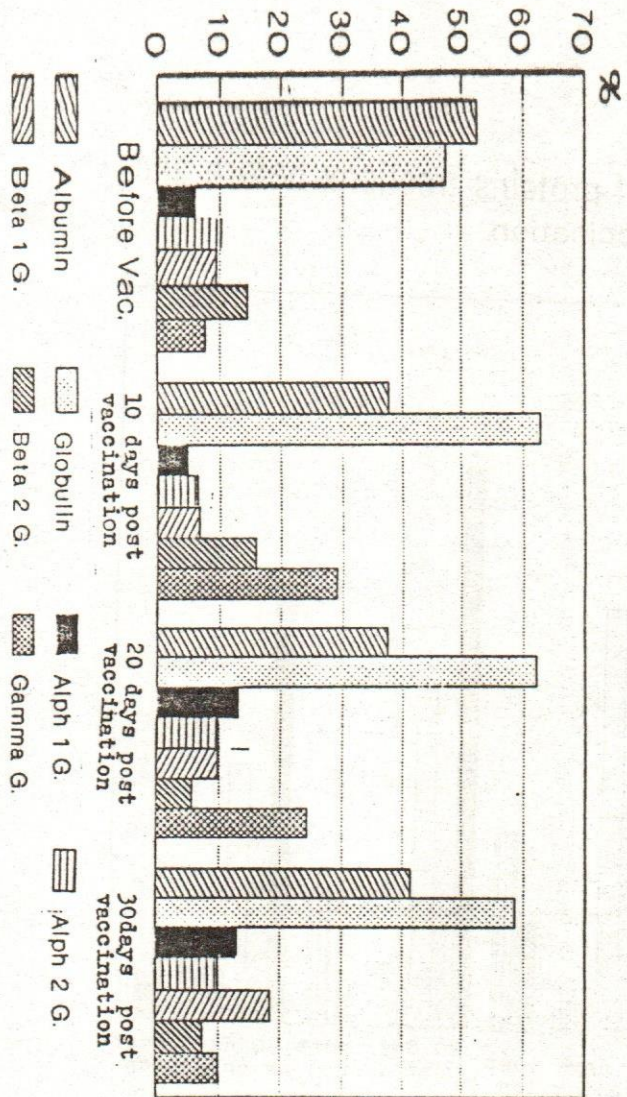
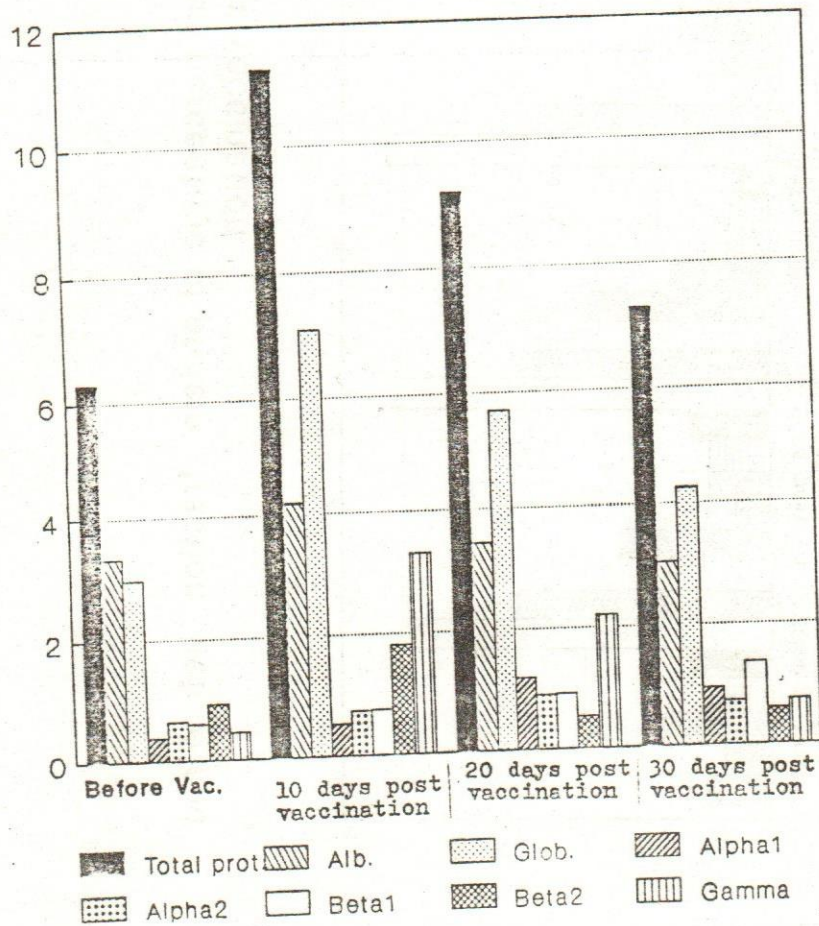


Fig. (2): Values of proteins fractions before and after vaccination.



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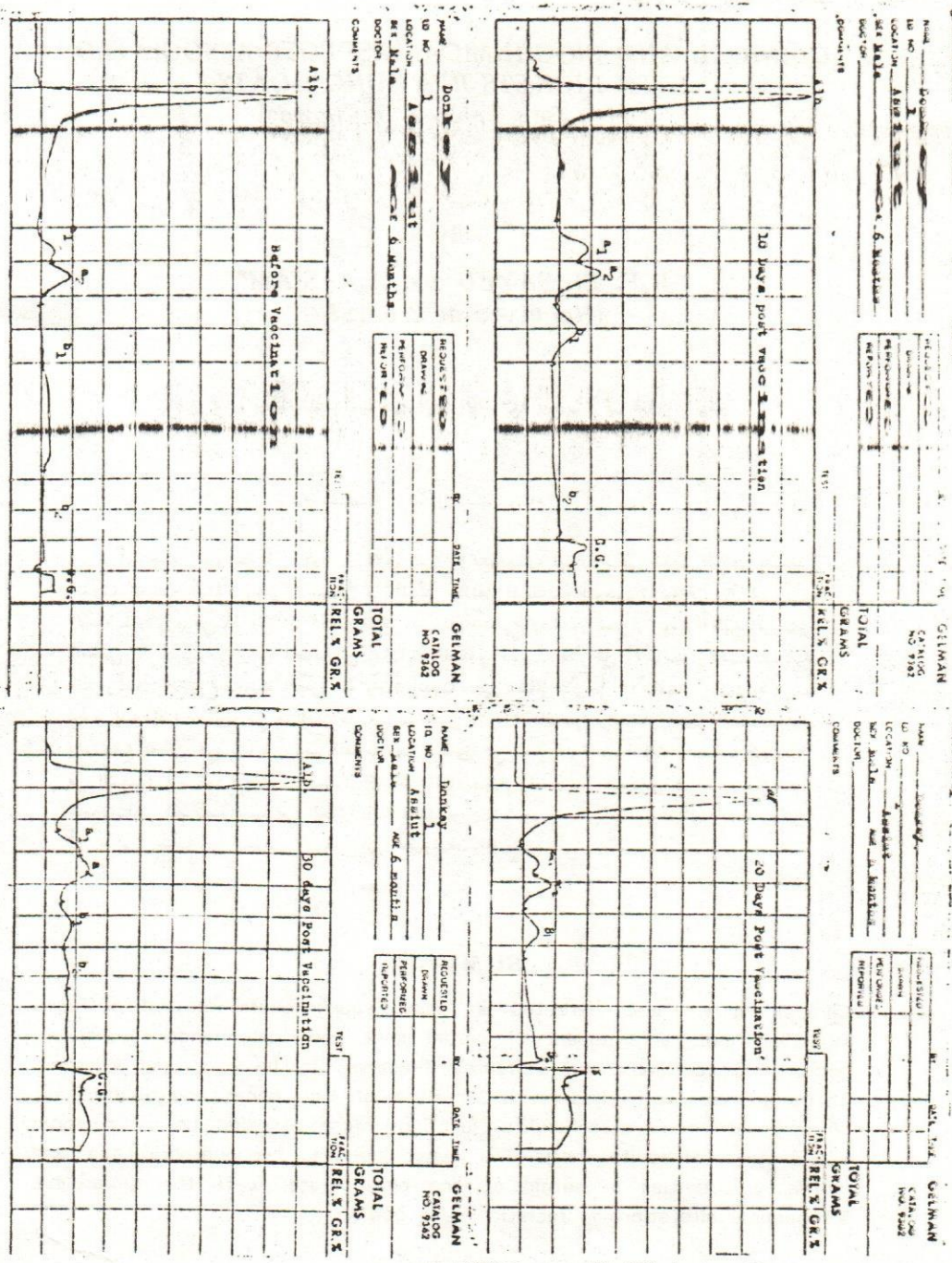


Fig. 3